

Work Order ID 135163

July 31, 2015 3:24:41 PM

A.D. 15-08-10 *135163*

Page 1

Item ID: D350-748-243TRN

Accept

N900040100

Setup Start

NS1

Revision ID:

Item Name: Crosstube Installation, High Aft

Stop

NS2

Start Date: 7/31/2015 Start Qty: 1.00

1

Cust Item ID:

Required Date: 8/14/2015 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: *SH*

Date: 20150731

Tooling:

Date:

Run Start

NR1

QC:

Date:

SPC (Y/N):

Date:

Stop

NR2

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

Draw Nbr

Revision Nbr

D350-748-243

A

100

0.00

100

MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.03

Mori Seiki CNC Lathe Large

1-Fill tube with sand & install plugs on both ends as per Folio _____

2-Turn first side as per Folio _____

3- File transition lines smooth.

FOLIO REV: *AB*

DWG REV: *AB*

110

QC1 - Inspection performed by CMM

0.00

110

QC

Memo

0.00

Quality Control

mmml
15/08/14

mmml
15/08/17

DQA:

Date:



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed:

Date:

Work Order update only ☐

Work Order: <u>135163</u>		DISPOSITION		AGAINST DEPARTMENT/PROCESS			
Part No. <u>D350748243TEN</u>		Rework ☐		Skid-tube ☐	Cross tube ☒	Water Jet ☐	Engineering ☐
NCR No. <u>15-5360</u>		Scrap ☐		Machining ☐	Small Fab ☐	Prod. Eng. Coord. ☐	Quality ☐
		Use-as-is ☒		Thermoforming ☐	Finishing ☐	Rec/Store/Packaging ☐	Other ☐
		Suspected Unapproved ☐		Large Fab ☐	Composite ☐	Supplier ☐	
Date: <u>15-08-08</u>		Step #: <u>150</u>		QTY Effective: <u>①</u>		MRB (QSI042) Approval	
						DAS 12 9-89 15/9/3	
Description Work Order Deviation				Disposition			
Wall thickness measurement is over tolerance,				Acceptable. Min. wall is within 0.020 of dry nominal			
				Completed By DAS 47 15-09-09 9-89			
				Lead hand / Supervisor Approval Verification DAS 47 15-09-09 9-89			
				QC / QA Coordinator Approval DAS 9 15-09-09 9-89			
Root Cause		FAULT CATEGORY					
Environment ☐	No Re-verification ☐	Pressure/Forced ☐	Temperature/Cure ☐	Power Loss/Surge ☐	Positioned Wrong ☐		
Design ☐	Operator ☐	Bending ☐	Set-up ☐	Folio/Program ☐	Outside Dimensions ☐		
Doc/Data ☐	Offset/Setup ☐	Centre Not Concentric ☐	BOM/Route ☐	Grain ☐	☒ Over/Under tolerance		
Equip/Tooling ☐	Supplier ☐	Cracks ☐	Broken/Damage/Defect ☐	Weld ☐	Part Incorrect ☐		
Handling/Pre ☐	Training ☐	Crimp/Kink/Ripple/Wave ☐	Inspection Incomplete/Unqualified ☐	Wrong Stock Pulled ☐	Part Lost/Missing ☐		
Material ☒	Use for Testing ☐	Cuffs ☐	Contamination ☐	Out of Sequence ☐	Part Moved ☐		
Internal Transport ☐	Poor Information ☐	Crushing ☐	Countersink ☐	Off-set ☐	Drawing ☐		
Tribal Knowledge ☐	Rushing ☐	Heat Treat ☐	Cut Too Short ☐	Mislabeled ☐	Finish ☐		
LOA ☐	Product Improvement ☐	Wave/Twist in Tube ☐	Instructions Incomplete/Unclear ☐	Fit/Function ☐	Misread ☐		
Substation ☐	Process Improvement ☐	Marks/Chatter ☐	Drill Holes ☐	Misaligned/off center ☐	Turning Sequence ☐		
Past Expiry Date ☐	Manufacturing Process ☐						
Misidentified ☐	Past Due ☐	OTHER: ☐					

Work Order ID 135163***135163***

Page 2

Item ID: D350-748-243TRN

Accept

N900040100Setup Start ***NS1***

Revision ID:

Stop ***NS2***

Item Name: Crosstube Installation, High Aft

Start Date: 7/31/2015 Start Qty: 1.00

1

Cust Item ID:

Required Date: 8/14/2015 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
120		0.00							
120	MORI SEIKI CNC LATHE LARGE								
Mori Seiki	Memo	0.05							
Mori Seiki CNC Lathe Large	1-Turn second side as per Folio _____ 2- File transition lines smooth. 3-Scribe Part & Batch as per Dwg D350-748-143 FOLIO REV: <u>AA</u> DWG REV: <u>A</u>								mmml 15/08/18
130		0.00							
130	QC1- Inspection performed by CMM								
QC	Memo	0.00							
Quality Control									mmml 15/08/18 P.T.O.
140		0.00							
140	QC8- Inspect parts - second check								
QC	Memo	0.00							
Quality Control									PAS Page 47 9-89 15-08-24

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS <table style="width:100%; border: none;"> <tr> <td style="border: none;">Skid-tube ☐</td> <td style="border: none;">Cross tube ☐</td> <td style="border: none;">Water Jet ☐</td> <td style="border: none;">Engineering ☐</td> </tr> <tr> <td style="border: none;">Machining ☐</td> <td style="border: none;">Small Fab ☐</td> <td style="border: none;">Prod. Eng. Coord. ☐</td> <td style="border: none;">Quality ☐</td> </tr> <tr> <td style="border: none;">Thermoforming ☐</td> <td style="border: none;">Finishing ☐</td> <td style="border: none;">Rec/Store/Packaging ☐</td> <td style="border: none;">Other ☐</td> </tr> <tr> <td style="border: none;">Large Fab ☐</td> <td style="border: none;">Composite ☐</td> <td style="border: none;">Supplier ☐</td> <td></td> </tr> </table>						Skid-tube ☐	Cross tube ☐	Water Jet ☐	Engineering ☐	Machining ☐	Small Fab ☐	Prod. Eng. Coord. ☐	Quality ☐	Thermoforming ☐	Finishing ☐	Rec/Store/Packaging ☐	Other ☐	Large Fab ☐	Composite ☐	Supplier ☐																																															
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OTHER :																																																																							

Work Order ID 135163

135163

Page 3

July 31, 2015 3:24:41 PM

Item ID: D350-748-243TRN

Accept

N900040100

Setup Start ***NS1***

Revision ID:

Item Name: Crosstube Installation, High Aft

Stop ***NS2***

Start Date: 7/31/2015 Start Qty: 1.00

1

Cust Item ID:

Required Date: 8/14/2015 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
150		0.00							
150	Large Fab								
Crosstubes	Memo	0.02							
Crosstubes	1-Grind machining marks								
190		0.00							
190	Packaging								
Packaging	Memo	0.00							
Packaging	Identify and stock in kanban rack Location: <u>LG003</u>								
200		0.00							
200	QC21- Final Inspection - Work Order Release								
QC	Memo	0.02							
Quality Control									

TW 15-09-17

TW 15-09-18

MLJ SEP 21 2015

Set 20150921

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____	DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐	AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐			
Date :	Step #:	QTY Effective :		MRB (QSI042) Approval	
Description Work Order Deviation		Disposition		Completed By	
				Lead hand / Supervisor Approval Verification	
				QC / QA Coordinator Approval	
Root Cause		FAULT CATEGORY			
Environment ☐ Design ☐ Doc/Data ☐ Equip/Tooling ☐ Handling/Pre ☐ Material ☐ Internal Transport ☐ Tribal Knowledge ☐ LOA ☐ Substation ☐ Past Expiry Date ☐ Misidentified ☐ No Re-verification ☐ Operator ☐ Offset/Setup ☐ Supplier ☐ Training ☐ Use for Testing ☐ Poor Information ☐ Rushing ☐ Product Improvement ☐ Process Improvement ☐ Manufacturing Process ☐ Past Due ☐	Pressure/Forced ☐ Bending ☐ Centre Not Concentric ☐ Cracks ☐ Crimp/Kink/Ripple/Wave ☐ Cuffs ☐ Crushing ☐ Heat Treat ☐ Wave/Twist in Tube ☐ Marks/Chatter ☐ Temperature/Cure ☐ Set-up ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Inspection Incomplete/Unqualified ☐ Contamination ☐ Countersink ☐ Cut Too Short ☐ Instructions Incomplete/Unclear ☐ Drill Holes ☐	Power Loss/Surge ☐ Folio/Program ☐ Grain ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set ☐ Mislabeled ☐ Fit/Function ☐ Misaligned/off center ☐ Positioned Wrong ☐ Outside Dimensions ☐ Over/Under tolerance ☐ Part Incorrect ☐ Part Lost/Missing ☐ Part Moved ☐ Drawing ☐ Finish ☐ Misread ☐ Turning Sequence ☐			
OTHER : ☐					

Picklist Print

July 31, 2015 3:24:48 PM

Page 1

Work Order ID: 135163

135163

Parent Item: D350-748-243TRN

D350-748-243TRN

Parent Item Name: Crosstube Installation, High Aft

Start Date: 7/31/2015

Required Date: 8/14/2015

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev: PRELIM New Issue LL 12.05.08

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D6021-125		Manufactured	No				Each	103.0000		1			

D6021-125

Crosstube Material - 17-4Ph SS

Location

Loc Qty

Loc Code

HALL

71

127271

35

127272

16

85076

20

LG

32

127272

32

1 m m L 15/08/13

Item	Qty	Part Number	Description
	-243		
1	X	D350-748-243	CROSSTUBE ASSEMBLY (AS 350/355 HI AFT)
2	1	D6021-125	CROSSTUBE
3	2	D3502-1	SUPPORT
4	2	D5123-7	CLAMP CUSHION
5	1	AETC-1032	INSERT
6	2	MS21920-20 OR MS21920-21/-22	CLAMP (PER DART SPEC. M-MS21920-20/-21/-22)
7	1	NAS1149C0363R	WASHER (OR AN960C10)
8	1	NAS1635-3-8	SCREW (OR MS51958-63)
9	A/R	PROSEAL 890 B-2	SEALANT, AMS-S-8802 CLASS B-2

GENERAL NOTES:

- MATERIAL: MANUFACTURED FROM D6021-125
FINISHED LENGTH AFTER TURNING = 124.70±0.06 (AFTER BENDING/TRIMMING = 122.70 REF)
- FINISH: PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- TOLERANCE: PER DART QSI 018 UNLESS OTHERWISE NOTED.
WALL THICKNESS ECCENTRICITY PER DART QSI 038 7.2
MIN. ALLOWABLE WALL IS -0.020 FROM NOMINAL
- UNITS: INCHES UNLESS OTHERWISE NOTED.
- BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- IDENTIFICATION: DART PART NUMBER "D350-748-243" AND BATCH NUMBER ON INSIDE OF CUFF
PER DART QSI 044 6.4 (VIBRATING STYLUS)
- WEIGHT: 29.85 lbs
- PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.290 HOLE.
- EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.

TURNING

- BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.

BENDING

- BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES PER SIDE. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D. ON TOP HALF OF BEND, AND 8% ON BOTTOM HALF OF BEND.
- MAX AMPLITUDE OF RIBBLING ALONG BENT PORTION OF THE TUBE IS 0.030 (ZN A1-3)
- MAX TWIST: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.38 (ZN C1-3).

ASSEMBLY

- TO INSTALL D3502-1 SUPPORT: ABRASE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.02" TO 0.05" THICK LAYER OF PROSEAL 890 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.
- TORQUE CLAMPS 60 TO 80 IN.-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 890 SEALANT HAS CURED FOR 72 HOURS.

135163
20150807
RELEASED

UNDER REVIEW

2015 MAR 18

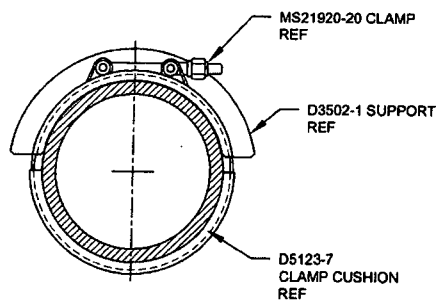
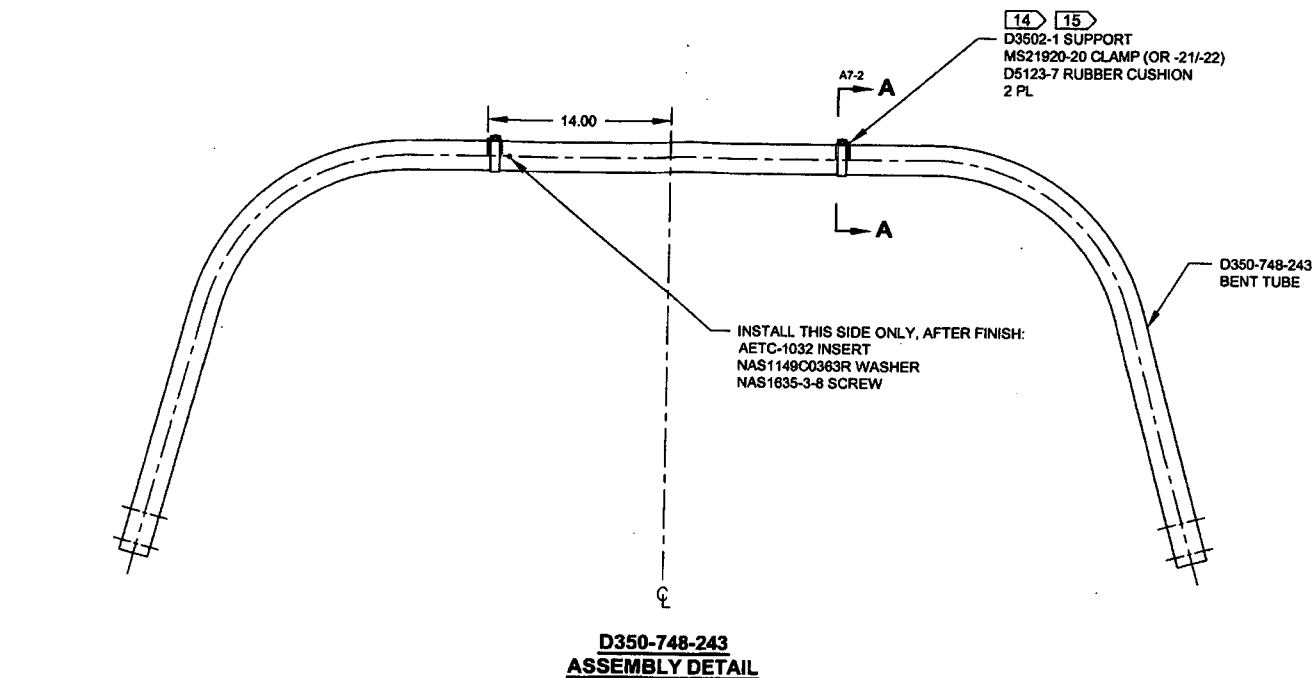
ECN 15-547

15/4/15
LRF 15-541

A	NEW ISSUE	CP	15.01.21
REV.	DESCRIPTION	BY	DATE
DESIGN			
DRAWN			
CHECKED			
MFG. APPR.			
APPROVED			
DE APPR.			
DATE	15.01.21		

DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWING NO. D350-748-243	REV. A SHEET 1 OF 4
TITLE CROSSTUBE (AS 350/355 HI AFT)	SCALE NTS

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SECTION A-A D4-2
SCALE 6X

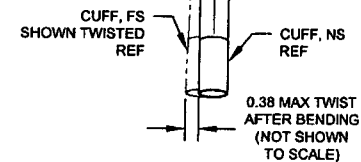
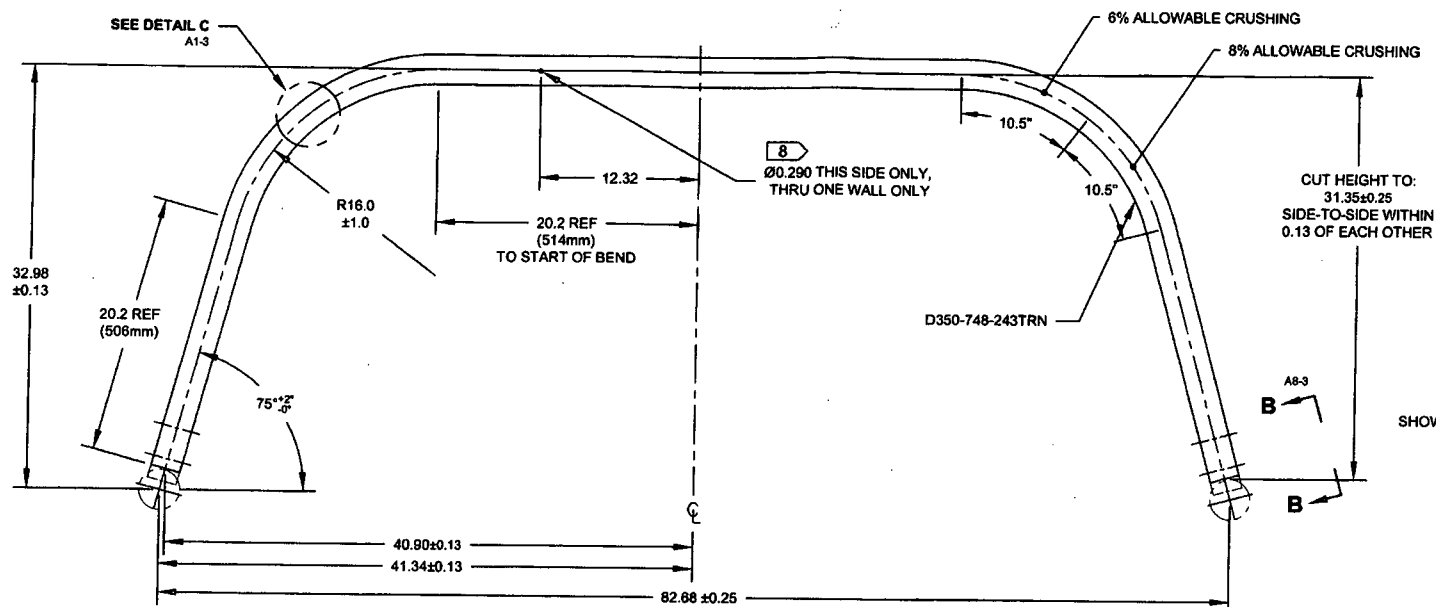
UNDER REVIEW

15/1/21

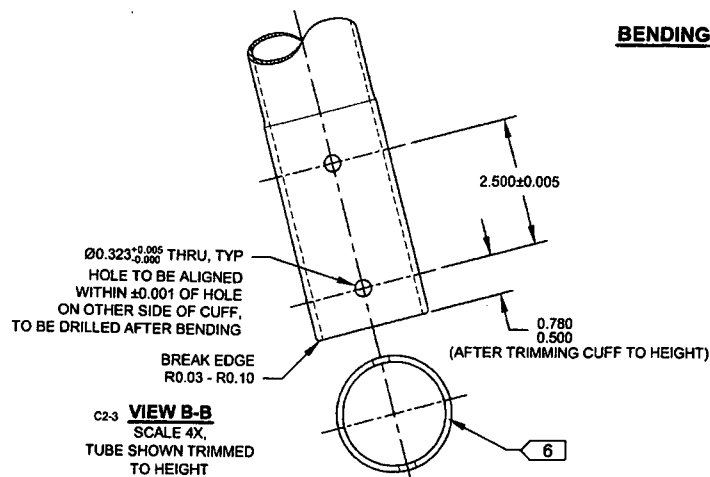
RELEASED

2015 MAR 18

DESIGN	92	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWN	92		
CHECKED	A.P.	DRAWING NO.	REV. A
MFG. APPR.	2/1/21	D350-748-243	SHEET 2 OF 4
APPROVED	2/1/21	TITLE	SCALE
DE APPR.	2/1/21	CROSSTUBE (AS 350/355 HI AFT)	NTS
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D350-748-243
BENDING AND DRILLING DETAIL 11



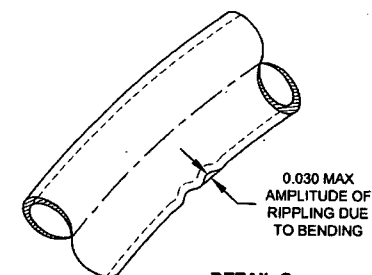
VIEW B-B
SCALE 4X,
TUBE SHOWN TRIMMED
TO HEIGHT

RELEASED

2015 MAR 18

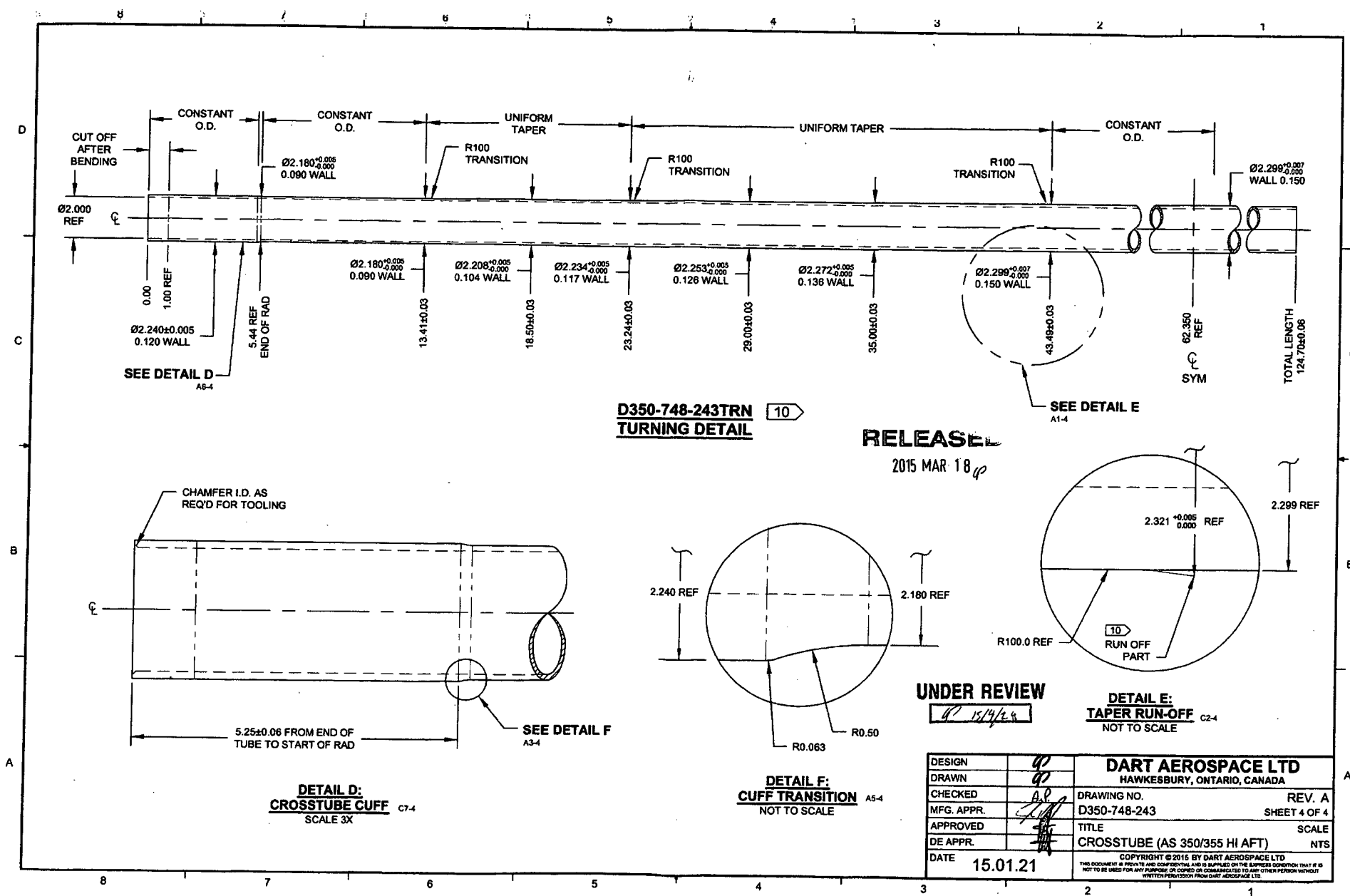
UNDER REVIEW

15/14/18



DETAIL C D7-3
SCALE 4X
RIBBLING EXAGGERATED

DESIGN	q	DART AEROSPACE LTD	
DRAWN	q	HAWKESBURY, ONTARIO, CANADA	
CHECKED	A.P.	DRAWING NO.	REV. /
MFG. APPR.	<i>[Signature]</i>	D350-748-243	SHEET 3 OF 4
APPROVED	<i>[Signature]</i>	TITLE	SCALE
DE APPR.	<i>[Signature]</i>	CROSSTUBE (AS 350/355 HI AFT)	NT
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DART AEROSPACE LTD		Work Order: 135163
Description: Crosstube Assembly (AS350/355 High Aft)		Part Number: D350-748-241
Inspection Dwg: D350-748-241 Rev: A <i>A man C</i>		Page 1 of 2

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mmC

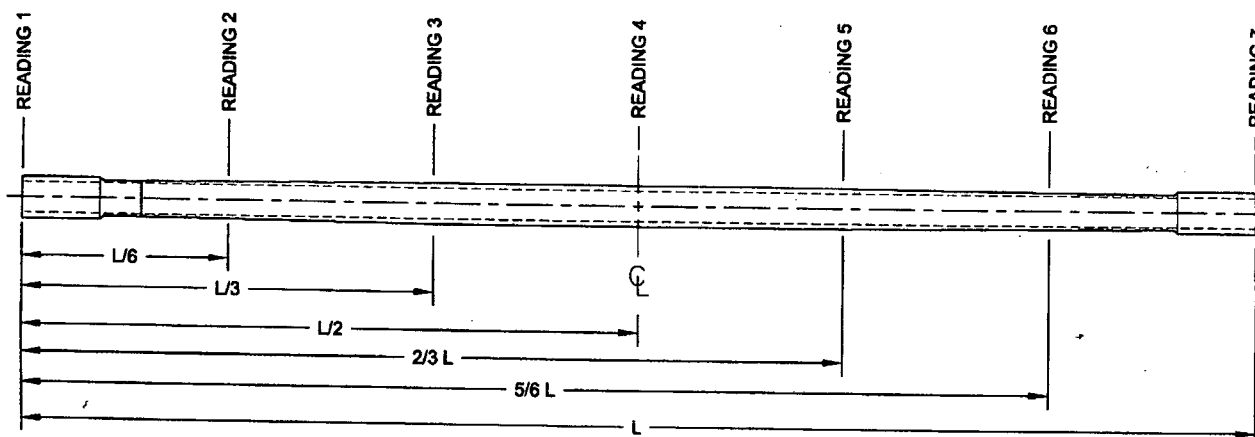
FIRST ARTICLE INSPECTION CHECKLIST

Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.240	+0.005/-0.000	2.244	✓		
	2.180	+0.005/-0.000	2.183	✓		
	2.180	+0.005/-0.000	2.182	✓		
	2.208	+0.005/-0.000	2.210	✓		
	2.234	+0.005/-0.000	2.235	✓		
	2.253	+0.005/-0.000	2.253	✓		
	2.272	+0.005/-0.000	2.277	✓		
	2.299	+0.005/-0.000	2.304	✓		
	0.063	+/-0.010	.063	✓		
	5.25	+/-0.060	5.26	✓		
	R0.063	+/-0.010	.063	✓		
	R0.50	+/-0.030	.500	✓		
SIDE B	2.240	+0.005/-0.000	2.244	✓		
	2.180	+0.005/-0.000	2.184	✓		
	2.180	+0.005/-0.000	2.182	✓		
	2.208	+0.005/-0.000	2.210	✓		
	2.234	+0.005/-0.000	2.235	✓		
	2.253	+0.005/-0.000	2.253	✓		
	2.272	+0.005/-0.000	2.277	✓		
	2.299	+0.005/-0.000	2.304	✓		
	0.063	+/-0.010	.063	✓		
	5.25	+/-0.060	5.26	✓		
	R0.063	+/-0.010	.063	✓		
	R0.50	+/-0.030	.500	✓		
	124.70	+/-0.060	124.7	✓		

DART AEROSPACE LTD		Work Order: 135163
Description: Crosstube Assembly (AS350/355 High Aft)		Part Number: D350-748-241
Inspection Dwg: D350-748-241 Rev: N Ammc		Page 2 of 2

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mm

WALL THICKNESS MEASUREMENT



Location	WALL THICKNESS MEASUREMENT (IN)				Deviation Δw (max-min)	TOLERANCE
	w1	w2	w3	w4		
READING 1 L= 0"	.136	.134	.126	.121	.015	0.030"
READING 2 L= 21	.126	.145	.117	.094	<.0517	
READING 3 L= 42	.153	.160	.163	.151	.012	
READING 4 L= 62	.157	.158	.159	.155	.004	
READING 5 L= 83	.164	.152	.145	.158	.019	
READING 6 L= 104	.120	.105	.114	.130	.025	
READING 7 L= 124	.127	.128	.132	.131	.005	

Dwg Δ
0.011 0.017

Calibration Result

Actual Block Thickness: 1.00 550

SITESCAN 250 Measured Thickness: 1.00 560

Measured by: Ammc
Date: 15/08/19

Audited by: 47
Date: 15-08-24

Preliminary Approval:
Date:

Rev	Date	Change	Revised by	Approved
B	12.02.02	Dwg Rev updated (P/O D350-748-201)	KJ	
C	12.06.04	Wall thickness form added	KJ	
D	13.02.27	Dimension 5.25 was 4.26	KJ	
E	14.04.25	122.70 dimension revised to 124.70	KJ	
F	15.04.14	Dwg Rev updated	KJ	

